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ENVIRONMENTAL PROTECTION AGENCY

■

WATER PROGRAMS

Secondary Treatment Information

Title 40—Protection of Environment

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

SUBCHAPTER D—WATER PROGRAMS

[FRL 510-7]

PART 133—SECONDARY TREATMENT INFORMATION

Biochemical Oxygen Demand, Suspended Solids and pH

On August 15, 1975, notice was published in the FEDERAL REGISTER that the Environmental Protection Agency was proposing the amendment of the Secondary Treatment Information regulation contained in 40 CFR Part 133 and promulgated on August 17, 1973 pursuant to sections 301 and 304 of the Federal Water Pollution Control Act Amendments of 1972 (Pub. L. 92-500, the Act). The proposed amendment was for the deletion of § 133.102(c) (limitations for fecal coliform bacteria) and the addition of § 133.103(c) ("Special Consideration" for clarification of the pH limitations contained in § 133.102(d)). Published in the FEDERAL REGISTER concurrently with the proposed amendment of 40 CFR Part 133 was a supplementary statement of EPA policy on the disinfection of municipal wastewater.

Written comments on the proposed rulemaking and statement of policy were invited and received from interested parties. The Environmental Protection Agency has carefully considered all comments received. All written comments are on file with the Agency.

Virtually all of the comments on the proposed rule changes concerned the intent and effect of the deletion of the fecal coliform bacteria limitations from 40 CFR Part 133 and the limiting of the pH requirements to processes using inorganic chemicals and/or those receiving significant industrial contributions.

The majority of the responses received indicated support for either one or both of the proposed amendments. The proposed amendment for deletion of the fecal coliform limitations from 40 CFR Part 133 specified reliance on State water quality standards for establishment of minimum disinfection requirements for publicly owned treatment works (POTW's). A significant majority of the responding State agencies (i.e., the agencies responsible for setting and implementing water quality standards) supported the amendment for deletion of the fecal coliform limits from 40 CFR Part 133.

The other principal comments received and the responses to them are summarized below:

(a) Several comments indicated support of an amendment to 40 CFR Part 133 to achieve flexibility in establishment of disinfection requirements but advocated alternatives other than the one proposed (i.e., deletion of the fecal coliform bacteria limitations from the Secondary Treatment Regulations). The alternatives suggested were: (1) Retaining the limits on fecal coliform bacteria in 40 CFR Part 133 but allowing a variance procedure to permit case-by-case exceptions, (2) raising the numerical limits on fecal coliform bacteria in 40 CFR Part 133, and (3) adopting a control parameter other than fecal coliform bacteria (e.g., total coliform bacteria or minimum chlorine residual).

Reliance on water quality standards for establishment of disinfection requirements for POTW's in lieu of limitations in 40 CFR Part 133 was selected by the Agency because the regulatory scheme established by the Act specifies the use of water quality standards for control of those pollutants which are not limited by uniformly applied effluent standards or for which more stringent limitations than those required by minimum effluent standards are required to achieve specific water quality needs. Development and implementation of water quality standards pursuant to the requirements of Pub. L. 92-500 are currently being carried out by the States so that transition to reliance on water quality standards for establishment of disinfection requirements for POTW's can be handled with a minimum amount of disruption.

The Agency also believes that because of the potential problems associated with the unnecessary use of disinfectants and the variable need for disinfection from one area of the country to another or one season to another, it is best to set disinfection requirements for POTW's on a case-by-case basis. By deleting the fecal coliform bacteria limitations from 40 CFR Part 133, the States will have the flexibility to establish disinfection requirements for POTW's in accordance with local needs. Accordingly, one of the alternate regulatory schemes suggested for control of disinfection practices, such use of total coliform bacteria as an indicator or less stringent limits on fecal coliform bacteria, may be appropriate for specific water quality needs and implemented locally. In other areas where disinfection of municipal wastewater discharges will be widely required in accordance with local water quality and public health needs, a general provision for disinfection with specific case-by-case exceptions may be appropriate.

(b) A number of comments disagreed with the proposed amendment for deletion of the fecal coliform bacteria limitations from 40 CFR Part 133 because it would shift the responsibility for implementation of disinfection requirements to the States and because the Agency had not supplied sufficient guidance to the States in the area of wastewater disinfection.

As indicated in the FEDERAL REGISTER notice of August 15, 1975, virtually every State and territory has water quality related standards pertaining to wastewater disinfection. Because the requirements of Pub. L. 92-500 are in the process of being implemented and control of municipal wastewater disinfection is in a transitional stage, State standards continue to dominate disinfection practices in most areas. Protection of public health from disease has been and continues to be a primary objective under the present system of control of disinfection of municipal wastewater by means of State standards. As noted previously, the major of the State agencies responsible for establishment and implementation of disinfection requirements which responded with comments supported the proposed amendment. Several States submitted proposals for State disinfection requirements which were being considered for implementation in anticipation of the final amendment of 40 CFR Part 133 for deletion of the fecal coliform bacteria limitations.

Disinfection requirements for POTW's are and will continue to be enforceable conditions of permits issued under the authority of the National Pollutant Discharge Elimination System (NPDES). The Agency has prepared guidance for implementing the change in disinfection requirements for POTW's in NPDES permits. This guidance was prepared with the intent of simplifying the procedure for assigning effluent limitations for indicator organisms for municipal wastewater discharges so that the transition from effluent based disinfection requirements to water quality based requirements will be both efficient and effective.

The Agency has recently published in draft form, "Quality Criteria for Water" with the stated objective of providing the basis of judgment in several EPA and State programs that are associated with water quality considerations. Included in "Quality Criteria for Water" are chapters which provide guidance on standards for coliform bacteria and chlorine.

Also available to provide background guidance on municipal wastewater disinfection practices is the final "Task Force Report—Disinfection of Wastewater." The report is available from the General Services Administration (8FY), Centralized Mailing Lists Services, Building 41, Denver Federal Center, Denver, Colorado 80225. The title and number of the report are: "Disinfection of Wastewater—Task Force Report," MCD-21: No. EPA-430/9-75-012.

(c) Several comments were received which questioned: (1) The impact of the deletion of the fecal coliform bacteria limitations from 40 CFR Part 133 on the use of chlorine and alternative disinfectants; (2) the potential inconsistency of the proposed rule change with section 101(a)(2) of the Act which specifies as an interim a national goal, wherever attainable, fishable and swimmable waters by 1983; and (3) the effect of the proposed deletion of the fecal coliform bacteria limits from 40 CFR Part 133 on reducing the potential hazard associated with the formation of carcinogenic compounds as a result of municipal wastewater disinfection. Similarly, other responses were received which commented that the FEDERAL REGISTER notices may jeopardize the protection of public health from disease because the notices appear to de-emphasize the importance of municipal wastewater disinfection.

The position of the Environmental Protection Agency has been and continues to be that the overriding criterion, with respect to decisions concerning the practice of municipal wastewater disinfection, is protection of public health from infectious disease. The Agency, however, also recognizes that protection of public health from disease can be maintained without continuous disinfection of all municipal wastewater discharges. Because chlorination is the wastewater disinfection process which is presently available for widespread application, retention of the fecal coliform bacteria limitations in 40 CFR Part 133 as originally promulgated would significantly increase the use of chlorine for wastewater disinfection in this country. The potential for problems such as toxicity to human and aquatic environments and excessive expenditure of valuable energy and monetary resources is increased unnecessarily as a result of a regulation which requires disinfection in certain instances where it is not necessary for the protection of public health from disease. It is the finding of the Agency that public health can be maintained in the future without inadvertently contributing to these problems.

The increase in the use of chlorine for sanitation purposes (including municipal wastewater disinfection) in this country prior to the implementation of Pub. L. 92–500 has been approximately the same as the annual rate of increase in the amount of wastewater discharged from POTW's—four percent. It is projected that the use of chlorine for municipal wastewater disinfection would increase by an average of approximately 10 percent per year during the period that Pub. L. 92–500 is being implemented (1973–1983) if continuous disinfection of municipal wastewater discharges remains as a requirement of 40 CFR Part 133. The difference in the amount of chlorine used for municipal wastewater disinfection, assuming an annual increase of 10 percent as opposed to 4 percent, would be 184,000 tons per year by 1983 which is greater than the estimated total use of chlorine for municipal wastewater disinfection in 1974. Furthermore, it is likely that the annual increase in the use of chlorine will be less than 4 percent per year as the effluent quality of discharges from POTW's improve (i.e., less disinfectant is generally required to achieve the same level of disinfection as effluent quality increases), as operational procedures for control of disinfection processes improve, and as the use of alternate disinfectants increases.

Concerning the use of alternate disinfection processes, the Agency has an extensive, on-going research and development program for the development and demonstration of alternate disinfection processes and improved control of chlorination processes. The "Task Force Report—Disinfection of Wastewater" summarizes the pertinent information concerning alternative processes for disinfection (including reliability, safety and cost) and describes the Agency's research and development program in the area of wastewater disinfection.

With regard to the use of chlorine for wastewater disinfection, the Agency recognizes the continuing need for the protection of public health from disease and does not believe there is conclusive evidence to warrant the prohibition of the use of chlorine for wastewater disinfection at the present time. The cost of chlorination/dechlorination should be compared to that of alternative disinfection processes when the need for disinfection and protection of aquatic life co-exist. Comparison of the costs for alternative disinfection processes to determine cost-effectiveness is required by law for projects involving the construction of disinfection facilities funded with construction grants under Title II of Pub. L. 92–500. Serious consideration should be given to use of alternate disinfection processes in those areas where organic compounds which can react with chlorine to form potentially toxic compounds are known to exist in the wastewater. However, it is recognized that chlorination processes will generally be the most cost effective at the present time. It is for this reason, in part, that establishment of disinfection requirements for POTW's on a case-by-case basis in accordance with specific water quality criteria is important.

Other responses commented that the deletion of the fecal coliform limitations from 40 CFR Part 133 is inconsistent with the goal of Pub. L. 92–500 for attainment of fishable and swimmable waters by 1983 and may jeopardize the integrity of that requirement of the Act.

Water quality standards define conditions necessary to meet the 1983 goal uses of Pub. L. 92–500. Deleting the effluent limitations from 40 CFR Part 133 does not preclude the achievement of the 1983 goal because water quality standards are established, in part, to protect public health and allow recreation in and on the water. In cases where water quality standards do not describe conditions necessary for fishable/swimmable water, the EPA Regional Administrator, in accordance with section 302 of the Act, can establish effluent limitations on a case-by-case basis after a public hearing on the costs and benefits of achieving those limits. As achievement of fishable/swimmable waters becomes imminent, we will be in a better position to re-evaluate the disinfection requirements for municipal wastewater discharges in consideration of the improved water quality at that time. In the interim, time will be available for investigation of cost-effective alternate disinfection processes and analysis of more conclusive data on the potential hazards associated with wastewater disinfection.

(d) Several comments were received which indicated opposition to the proposed amendment for deletion of the fecal coliform bacteria limitations from 40 CFR Part 133 because bacteriological monitoring is important for protection of public health. Other comments expressed either support for or opposition to the continued use of fecal coliform bacteria as an indicator of the pathogenic contamination of water or wastewater. Comments were also received which questioned the retaining of disinfection requirements for POTW's as enforceable conditions of NPDES permits.

Opposition to the deletion of the fecal coliform bacteria limitations from 40 CFR Part 133 on the basis of discontinuance of bacteriological monitoring or retention of disinfection requirements in permits is apparently based on a misunderstanding of the purpose of the Secondary Treatment Regulation. In accordance with the provisions of Pub. L. 92–500, secondary treatment is the minimum level of treatment required for POTW's; 40 CFR Part 133 defines that level of treatment in terms of effluent quality. The fecal coliform bacteria limitations in 40 CFR Part 133 were, in essence, a requirement for continuous disinfection of wastewater effluents from POTW's and fecal coliform bacteria were the measure of the effectiveness of the disinfection process. As such, the limitations on fecal coliform bacteria in 40 CFR Part 133 are not actual permit conditions for monitoring and effluent quality, although they will obviously affect the permit requirements for POTW's.

Monitoring requirements and effluent limitations for municipal wastewater effluents are set in accordance with the pollutant parameters for which control is necessary. In those instances where disinfection is required and coliform limitations are established, obviously bacteriological monitoring and effluent limitations pertaining to disinfection will be necessary and shall be required as NPDES permit conditions. In those instances where bacteriological monitoring is not required as a permit condition, it shall have been previously determined that disinfection and effluent limitations for coliform bacteria are not necessary at that particular time for that particular discharge.

Concerning the use of fecal coliform bacteria as an indicator of pathogenic contamination, it is recognized that just as there is not an ideal disinfection process presently available, there also is not an ideal indicator of pathogenic contamination at the present time. The EPA is presently conducting several studies for the development of new microbiological indicators for water and wastewater examination. However, the use of coliform bacteria has historically proven to be a valuable and practical indicator of the relative disease causing potential of water and wastewater. The Agency believes the continued use of the available microbiological indicators (including total and fecal coliform bacteria) is essential for the protection of the public from disease.

(e) Comments were received which recommended limits on residual chlorine either for protection of aquatic life (maximum chlorine residual) or to ensure adequate disinfection (minimum chlorine residual). The comment was also received that maintenance of a minimum chlorine residual is not an accurate indication of the effectiveness of the disinfection process.

Limits on the maximum chlorine residual in wastewater effluents are con-

sidered necessary in some areas where protection of aquatic life from toxicity is important. Several States have established standards limiting the amount of chlorine allowable in wastewater discharges to certain types of waters. Also, as indicated previously, "Quality Criteria for Water" has a chapter which suggests criteria for total chlorine residual for protection of salmonid fish and other freshwater and marine organisms. Limitations on residual chlorine in municipal wastewater effluents obviously must be an integral part of water quality considerations and such limitations will be established on a case-by-case basis in accordance with the degree of protection necessary.

Specification of a minimum chlorine residual in wastewater effluents to ensure adequate disinfection has not been the approach used by the Agency because it is process related and precludes the use of alternative disinfection processes. Although the Agency does not intend to dictate the effluent parameter used to measure the effectiveness of disinfection processes for POTW's after deletion of the fecal coliform bacteria limitations from 40 CFR Part 133, support of nonprocess related indicators, such as coliform bacteria, is maintained for the same reasons that fecal coliform bacteria were originally selected as a measure of effluent quality for 40 CFR Part 133. The use of a minimum chlorine residual is, however, recognized as a valuable parameter for process control of well designed chlorination facilities. If chlorine residual is considered for use as a process control for chlorination facilities, it is recommended that a range of chlorine concentrations (maximum and minimum) be specified to not only ensure effective disinfection, but also to limit the amount of chlorine used and remaining at the time of discharge.

(f) Some commenters expressed the opinion that deletion of the fecal coliform limitations from 40 CFR Part 133 and reliance on State water quality standards will jeopardize water quality and the protection of public health in interstate waters. 40 CFR 130.17(c)(4) (Policies and Procedures for Continuing Planning Process-Water Quality Standards) requires that "The State shall take into consideration the water quality standards of downstream waters and shall assure that its water quality standards provide for attainment of the water standards of downstream waters." The Administrator must approve or disapprove any State water quality standards in accordance with section 303 of Pub. L. 92–500, and thus has the authority to rule in cases where State water quality standards for interstate water are in conflict.

(g) A number of comments were received which recommended that both the amendments for deletion of the fecal coliform bacteria limitations from 40 CFR Part 133 and the clarification of the pH limitations be extended to apply to industrial effluent limitations. Section 304(d)(1) of Pub. L. 92–500 requires that the EPA "publish information * * * on the degree of effluent reduction attainable through the application of secondary treatment." The basis which is to be considered as a minimum for effluent limitations for industrial dischargers (Section 304(b) of Pub. L. 92–500) is, in part, the limits of available technology. In consideration of these statutory differences, effluent limitations for municipal and industrial discharges will logically vary with regard to the control of one or more pollutant parameters.

(h) A number of commenters disagreed with the amendment concerning the pH limitations because they believed that acidic or basic discharges from biological treatment processes can be harmful to receiving waters in the same way that discharges from chemical treatment processes or processes with significant industrial contributions can. Similarly, other comments indicated that, even if the pH of the effluent falls within the range of 6–9, discharges from any type of municipal wastewater treatment plant can adversely affect receiving waters depending on the characteristics of the water body. Still other comments cited information which indicates that the pH of wastewater effluents generally has no significant effect on receiving waters because of the natural buffering capacity of most waters. For this reason, these comments recommended that the pH limitations be entirely deleted from 40 CFR Part 133.

No changes in the amendment for pH limitation have been made in response to these comments. Pub. L. 92–500 and its legislative history clearly shows that the Secondary Treatment Regulation is to be based on the capabilities of secondary treatment technology and not ambient water quality effects (S. Rep. 92–12361 Leg. Hist. 309; S. Rep. 92–414, Leg. Hist. 1461). In accordance with this principle, neutralization has historically been considered a component part of those secondary treatment processes which use inorganic chemicals for the treatment of wastewater (e.g., lime precipitation or mineral addition processes) and those processes which receive significant industrial flows that have not been pretreated for neutralization of acidic or basic wastes. Neutralization prior to discharge, however, has generally not been considered an integral part of the process in secondary treatment facilities which incorporate strictly physical and biological treatment methods.

In cases where control of pH within the range of 6–9 is not sufficient to protect receiving waters or where discharges not subject to the pH limitations of 40 CFR Part 133 will adversely affect receiving water quality, effluent limitations for pH based on water quality requirements will apply on a case-by-case basis. "Quality Criteria for Water" contains information and possible criteria for establishment of water quality standards for pH. As is the case with all water quality based standards, effluent limitations for pH which are established to achieve specific water quality objectives may be more stringent than or require limits on pollutant parameters not controlled by effluent limited (technology-based) standards such as 40 CFR Part 133.

(i) Comments were made that the proposed amendment for the pH limitations was unclear with respect to its applicability in situations where inorganic chemicals, such as disinfectants and flocculants, are added to supplement physical/biological secondary treatment processes. The amendment for the pH limitations has been reorganized as indicated below. The provisions pertaining to pH are now set forth in their entirety in § 133.102(c).

In consideration of the foregoing, Part 133 of Chapter I of Title 40 of the Code of Federal Regulations is amended as set forth below.

(Sec. 304(d)(1) and 301(b)(1)(B) of the Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. 1342, 1345 & 1361))

Dated: July 16, 1976.

RUSSELL E. TRAIN,
Administrator.

1. Section 133.102 is revised to read as follows:

§ 133.102 Secondary treatment.

The following paragraphs describe the minimum level of effluent quality attainable by secondary treatment in terms of the parameters—biochemical oxygen demand, suspended solids and pH. All requirements for each parameter shall be achieved except as provided for in § 133.103.

(a) *Biochemical Oxygen Demand (five-day).* (1) The arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 30 milligrams per liter.

(2) The arithmetic mean of the values for effluent samples collected in a period of 7 consecutive days shall not exceed 45 milligrams per liter.

(3) The arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85 percent removal).

(b) *Suspended solids.* (1) The arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 30 milligrams per liter.

(2) The arithmetic mean of the values for effluent samples collected in a period of 7 consecutive days shall not exceed 45 milligrams per liter.

(3) The arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85 percent removal).

(c) *pH.* The effluent values for pH shall be maintained within the limits of 6.0 to 9.0 unless the publicly owned treatment works demonstrates that:

(1) Inorganic chemicals are not added to the waste stream as part of the treatment process; and

(2) Contributions from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0.

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ENVIRONMENTAL PROTECTION AGENCY

[FRL 510-3]

MUNICIPAL WASTEWATER DISINFECTION

Secondary Treatment

The Environmental Protection Agency has amended the Secondary Treatment Information regulation contained in 40 CFR Part 133 and promulgated pursuant to section 304(d)(1) of the Federal Water P-'lution Control Act Amendments of 1972 (the Act). Section 301(b)(1)(B) of the Act requires the effluent limitations based on secondary treatment, be achieved for all publicly owned treatment works in existence on July 1, 1977, or approved for a construction grant prior to June 30, 1974 (for which construction must be completed within four years of approval). The amendment, published concurrently with this notification, deletes the fecal coliform bacteria limitations from the definition of secondary treatment.

At the time that 40 CFR Part 133 was first promulgated, limitations on fecal coliform bacteria were included in the definition of secondary treatment on the basis that disinfection is necessary for the protection of public health. In recognition of more recent information, it is now felt that it is environmentally sound to establish disinfection requirements for domestic wastewater discharges in accordance with water quality standards promulgated pursuant to section 302 and 303 of the Act and associated public health needs. In this manner, the necessary protection of public health can be assured, while achieving adequate safeguards against the adverse effects which could result from the excessive use of disinfectants.

In January 1974, an Environmental Protection Agency Task Force was formed to review EPA policy on wastewater disinfection and the use of chlorine. The Task Force recognized that chlorine and chlorine-based compounds are presently receiving essentially exclusive use for the disinfection of wastewater. While chlorine is an effective disinfectant with respect to meeting bacteriological standards and is adequately protecting public health, there are potential dangers associated with the use of chlorine. Disinfection of wastewater with chlorine can result in the formation of halogenated organic compounds which have been identified as potential carcinogens. Considerable data also exist to indicate that chlorination of wastewater can result in a residual chlorine level that is toxic to aquatic life. The Task Force concluded that in view of the fact that present policy inadvertently encourages the use of chlorine, a regulation which in certain instances requires disinfection unnecessarily further compounds the potential problems associated with the chlorination of wastewater.

Prior to the enactment of Pub. L. 92-500, domestic wastewater disinfection practice was, for the most part, controlled locally by the States. In proposing the deletion of the disinfection requirements from 40 CFR Part 133 and recommending reliance on water quality standards, the EPA made an assessment of the State standards relating to wastewater disinfection. It was determined that virtually all of the States and Territories have water quality related regulations pertaining to the disinfection of wastewater and that public health was adequately being maintained. In many instances, other than continuous disinfection was being practiced where the possibility of human contact with the receiving waters was remote.

Disinfection requirements have been and must continue to be directed at protecting the public health. Water quality standards which establish the need for disinfection must, as a minimum, include the following:

(1) Protection of public water supplies.

(2) Protection of fisheries and shellfish waters.

(3) Protection of irrigation and agricultural waters.

(4) Protection of waters where human contact is likely.

(5) Protection of interstate waters to which the above criteria apply.

The Agency published in draft form on October 10, 1975, Quality Criteria for Waters which is intended to be used as the basis for State water quality standards. Criteria for fecal coliform bacteria and chlorine are included. These criteria are available for use by the States in the development of water quality standards and the related disinfection requirements for publicly owned treatment works.

The benefits achieved by disinfection should be weighed against the environmental risks and costs. It is intended that the use of chlorine disinfection would be considered only when there are public health hazards to be controlled. The exclusive use of chlorine for disinfection should not be continued where protection of aquatic life is of primary consideration. Alternate means of disinfection and disinfectant control (dechlorination) must be considered where public health hazards and potential adverse impact on the aquatic and human environments co-exist. Disinfection should not be required in those instances where benefits are not present.

The final Task Force Report provides a compilation of the existing technical and scientific data related to the issues raised by wastewater disinfection. The report is divided into four main parts—Summary, Conclusions and Recommendations; Public Health Effects and Considerations; Toxic Effects on the Aquatic Environment; and Disinfection Process Alternatives. Also included in the report is a summary of the Agency's ongoing research and development program in the area of wastewater disinfection and alternate means of disinfection.

The report is available from the Centralized Mailing Lists Services, Building 41, Denver Federal Center, Denver, Colorado 80225. The title and number of the report are "Disinfection of Wastewater—Task Force Report;" MCD-21; No. EPA-430/9-75-012.

RUSSELL E. TRAIN,
Administrator.

JULY 16, 1976.

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